WHAT IS CLAIMED IS:

1. A measuring device for measuring an in-plane magnetization vector component of a magnetic substance to be measured, comprising:

a light source;

a focusing unit for focusing light flux from said light source and irradiating it to the magnetic substance to be measured;

a polarization split detector for detecting a light amount of a polarization component in one direction or separated each component of polarization components orthogonal to each other using a polarizer and photo-detectors in order to detect change in polarization state or light amount of the light flux reflected by the magnetic substance to be measured due to a magneto-optical effect; and

a half-turn asymmetric polarizing element acting only on the reflected light from the magnetic substance to be measured and acting in such a manner that its action on polarization distribution in a cross section of incident light flux has asymmetry nature about half-turn around an optical axis.

2. The measuring device according to claim 1,

wherein said half-turn asymmetric polarizing element is a half-turn asymmetric reflectional symmetry polarizing element whose action on the incident light flux has reflectional symmetry nature with respect to a certain plane including the optical

axis so that only one component of in-plane magnetization vectors of the magnetic substance to be measured can be measured separately from other two orthogonal components.

3. The measuring device according to claim 1, wherein said half-turn asymmetric polarizing element is a divisional half-wave element constituted of a half-wave element acting on a part of the cross section of the light flux to generate half-wave phase difference, or half-wave elements having different neutral axis azimuths in divided regions in the cross section of the light flux.

4. The measuring device according to claim 1, wherein said half-turn asymmetric polarizing element is a divisional polarization rotation element having ununiform polarization rotation action in the cross section of the light flux.

5. The measuring device according to claim 1, wherein said half-turn asymmetric polarizing element is a divisional phase modulator capable of controlling phase difference generated in each divisional region from outside.

6. The measuring device according to claim 1, wherein the photo-detector has an image detection element and an imaging lens for forming an image on the image detection element so that image data of in-plane magnetized distribution of the magnetic substance to be measured can be obtained.

7. The measuring device according to claim 1, wherein said focusing unit includes a near-field probe for generating near-field light and a focusing part for focusing propagation light generated as a result of interaction of the near-field light and the magnetic substance to be measured.

8. The measuring device according to claim 1, further comprising:

a probe having a magnetic substance,

wherein magnetization vector components of the magnetic substance of said probe are measured so that spatial magnetic field vector components at a probe position can be measured.

9. The measuring device according to claim 1, further comprising:

a light scanning unit for scanning a focusing spot position where a light beam from said light source is focused by said focusing unit; and

an automatic position control stage for moving and controlling a position of said half-turn asymmetric polarizing element in synchronization with scanning in at least one direction by said light scanning unit.

10. The measuring device according to claim 1, further comprising:

a relay lens for optically aligning a position of the light flux incident on said half-turn asymmetric

polarizing element with a position of a pupil of said focusing unit.

11. The measuring device according to claim 1,

wherein said half-turn asymmetric polarizing element receives passed light or passed and reciprocated light through the magnetic substance to be measured, and measures polarization rotation of the magnetic substance to be measured due to a Faraday effect.

12. The measuring device according to claim 1,

wherein said focusing unit includes a solid immersion lens.

13. The measuring device according to claim 1, further comprising:

a probe having a magnetic substance in a focusing part of said focusing unit,

wherein magnetization vector components of the magnetic substance of said probe are measured so that spatial magnetic field vector components at a position where said probe is placed can be measured.

14. The measuring device according to claim 1,

wherein said focusing unit is constituted of a focusing lens or focusing mirror and a light scattering type near-field probe arranged at a focusing position thereof and having a sharp tip, and light scattered at the probe tip and the magnetic substance to be measured is focused to detect change in polarization state or reflectivity thereof.

15. The measuring device according to claim 2, wherein said half-turn asymmetric reflectional symmetry polarizing element is divided by a straight line in two regions in the cross section of light flux, and each of the two regions is constituted of a half-wave element whose angles of a neutral axis from the straight line are +22.5 degree and -22.5 degree.

16. The measuring device according to claim 1, further comprising:

a Faraday cell provided before or after the magnetic substance to be measured or in an optical path where the light reflected by the magnetic substance to be measured reciprocates,

wherein a position and modulation spatial distribution of said half-turn asymmetric polarizing element are controlled to minimize a modulation amount of an output signal of said polarization split detector caused by modulation of said Faraday cell so that a position where detectivity to a perpendicular magnetization vector component is minimized can be found.

17. The measuring device according to claim 1, further comprising:

a Faraday cell which is provided before or after the magnetic substance to be measured or in an optical path where the light reflected by the magnetic substance to be measured reciprocates and

whose polarization rotation angle is previously corrected; and

a conversion unit for registering relationship between an output of said polarization split detector and a polarization rotation angle by said Faraday cell in a state of measuring a perpendicular magnetization vector component, and converting the output of said polarization split detector to the polarization rotation angle using the registered relationship in measuring the in-plane magnetization vector component.

18. A measuring device comprising:

a half-turn asymmetric reflectional symmetry polarized light source, as a light source, for outputting light flux whose intensity distribution has symmetry nature while polarization state distribution does not have symmetry nature about half-turn around an optical axis in a cross section of the light flux perpendicular to the optical axis, as well as whose intensity distribution and polarization state distribution in the cross section of the light flux are both symmetric about reflection with respect to a certain plane including the optical axis as a boundary plane;

a focusing unit for focusing the light flux from said half-turn asymmetric reflectional symmetry polarized light source and irradiating it to a magnetic substance to be measured; and

a polarization split detector for detecting a light amount of a polarization component in one direction or separated each component of polarization components orthogonal to each other using a polarizer and photo-detectors in order to detect change in polarization state or light amount of the light flux reflected by the magnetic substance to be measured due to a magneto-optical effect,

wherein an optical element existing in an optical path from light output of said light source to a position immediately before said polarization split detector and acting on the light flux has action on light intensity distribution and polarization distribution in the light flux which is symmetric around half-turn around an optical axis and reflection with respect to the boundary plane, and one or two polarization split detection azimuths orthogonal to each other of said polarization split detector and the boundary plane or a reflectional symmetry plane of the light flux incident when there is no magneto-optical action by the magnetic substance to be measured is set to make angles of integral multiples of 90 degrees so that only one component of in-plane magnetization vectors of the magnetic substance to be measured can be measured separately from other two orthogonal components.

19. The measuring device according to claim 18,

wherein said half-turn asymmetric reflectional symmetry polarized light source includes:

a natural light source, a partially polarized light source, or a linearly polarized light source; and

a divisional polarizer constituted of a polarizer which takes one of the polarization components and ununiformly acting in a cross section of light flux outputted from the linearly polarized light source.

20. The measuring device according to claim 18,

wherein said half-turn asymmetric reflectional symmetry polarized light source includes:

a linearly polarized light source; and

a divisional half-wave element having an element which generates half-wave phase difference and ununiformly acting in a cross section of light flux outputted from the linearly polarized light source.

21. The measuring device according to claim 18,

wherein said half-turn asymmetric reflectional symmetry polarized light source includes:

a linearly polarized light source; and

a divisional polarization rotation element having an element which rotates polarization and ununiformly acting in a cross section of light flux outputted from the linear polarized light source.

22. A measuring device for measuring only one component of in-plane magnetization vectors of a

magnetic substance to be measured separately from other two orthogonal components, comprising:

a light source;

a focusing unit for focusing light flux from said light source and irradiating it to the magnetic substance to be measured;

a polarization split detector for detecting a light amount of a polarization component in one direction or separated each component of polarization components orthogonal to each other using a polarizer and photo-detectors to detect change in polarization state or light amount of the light flux reflected by the magnetic substance to be measured due to a magneto-optical effect; and

a divisional half-wave element placed in an optical path between said light source and said focusing unit where the light reciprocates, and constituted of half-wave elements which are divided into two regions with a straight line as a boundary in a cross section of the light flux and whose respective neutral axes in the two regions and the boundary make angles of the same absolute value with opposite signs.

23. A measuring device for measuring an in-plane magnetization vector component of a magnetic substance to be measured, comprising:

a light source;

a focusing unit for focusing light flux from said light source and irradiating it to the magnetic substance to be measured;

a polarization split detector for detecting a light amount of a polarization component in one direction or separated each component of polarization components orthogonal to each other using a photo-detector to detect change in polarization state or light amount of the light flux reflected by the magnetic substance to be measured due to a magneto-optical effect; and

a divisional half-wave element in an optical path before said focusing unit where the light reciprocates, whose action on polarization distribution in a cross section of the light flux has asymmetry nature about half-turn around an optical axis.